

What Is Claimed Is:

1. A direct conversion receiver which is used in a radio unit and converts a reception signal inputted thereto from an antenna directly into a baseband signal, said radio unit using different frequencies for

5 transmission and reception, said receiver comprising:

a first local oscillator for generating a first local signal of a first local frequency  $f_{L01}$ ;

a second local oscillator for generating a second local signal of a second local frequency  $f_{L02}$ ;

10 an internal local signal generator for mixing the first local signal and the second local signal to generate an internal local signal; and

a quadrature demodulator for performing quadrature demodulation of the reception signal based on the  
15 internal local signal to generate the baseband signal; and wherein,

where a carrier frequency of a transmission signal of said radio unit is represented by  $f_t$  and a carrier frequency of the reception signal is represented by  $f_r$   
20 and a frequency interval  $f_s$  between the carrier frequencies of the transmission and reception signals is given as  $f_s = |f_r - f_t|$ ,

when  $f_r > f_t$ , said first local frequency  $f_{L01}$  satisfies  $f_{L01} \approx f_t - f_s$  while said second local

25 frequency  $f_{LO2}$  satisfies  $f_{LO2} \approx 2 \cdot f_s$  and a frequency of  
the internal local signal is a sum frequency of the first  
local frequency and the second local frequency, but

when  $f_r < f_t$ , the first local frequency  $f_{LO1}$   
satisfies  $f_{LO1} \approx f_t + f_s$  while the second local frequency  
30  $f_{LO2}$  satisfies  $f_{LO2} \approx 2 \cdot f_s$  and the frequency of the  
internal local signal is a difference frequency between  
the first local frequency and the second local frequency.

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2. A receiver according to claim 1, wherein said  
internal local signal generator includes a mixer for  
mixing the first local signal and the second local signal,  
and a band-pass filter for limiting frequency band of an  
5 output of said mixer.

3. A receiver according to claim 1, wherein said  
quadrature demodulator and said internal local signal  
generator are provided in a same LSI (large scale  
integration) chip.

4. A receiver according to claim 1, wherein the  
baseband signal outputted from said quadrature  
demodulator has a peak value of a component of the  
reception signal which has a phase same as that of the  
5 internal local signal and a peak value of another  
component of the reception signal which has a quadrature

phase to that of the internal local signal.

5. A receiver according to claim 4, wherein a band-pass filter for limiting frequency band of the baseband signal is connected to the output of said quadrature demodulator.

6. A transceiver which uses different frequencies for transmission and reception and converts a reception signal inputted thereto from an antenna directly into a reception baseband signal, comprising:

5       a first local oscillator for generating a first local signal of a first local frequency  $f_{L01}$ ;

      a second local oscillator for generating a second local signal of a second local frequency  $f_{L02}$ ;

      an internal local signal generator for mixing the  
10 first local signal and the second local signal to generate an internal local signal;

      a quadrature demodulator for performing quadrature demodulation of the reception signal based on the internal local signal to generate the baseband signal;

15       a frequency divider for dividing a frequency of the second local signal by 2 to generate a third local signal;

      a quadrature modulator for using the third local signal to performing quadrature modulation of a

20 transmission baseband signal to produce an intermediate frequency signal; and

a mixer for mixing the intermediate frequency signal and the first local signal to produce a transmission signal; and wherein

25 where a carrier frequency of the transmission signal is represented by  $f_t$ , a carrier frequency of the reception signal is represented by  $f_r$  and a frequency interval  $f_s$  between the carrier frequencies of the transmission and reception signals is given as  $f_s = |f_r -$   
30  $f_t|$ ,

when  $f_r > f_t$ , the first local frequency  $f_{L01}$  satisfies  $f_{L01} \approx f_t - f_s$  while the second local frequency  $f_{L02}$  satisfies  $f_{L02} \approx 2 \cdot f_s$  and a frequency of the internal local signal is a sum frequency of the first local  
35 frequency and the second local frequency, but

when  $f_r < f_t$ , the first local frequency  $f_{L01}$  satisfies  $f_{L01} \approx f_t + f_s$  while the second local frequency  $f_{L02}$  satisfies  $f_{L02} \approx 2 \cdot f_s$  and the frequency of the internal local signal is a difference frequency between  
40 the first local frequency and the second local frequency.

7. A transceiver according to claim 6, wherein said internal local signal generator includes a second mixer for mixing the first local signal and the second local signal, and a band-pass filter for limiting frequency

5 band of an output of said second mixer.

8. A transceiver according to claim 6, wherein said quadrature demodulator and said internal local signal generator are provided in a same LSI (large scale integration) chip.

9. A transceiver according to claim 6, wherein the reception baseband signal outputted from said quadrature demodulator has a peak value of a component of the reception signal which has a phase same as that of the  
5 internal local signal and a peak value of another component of the reception signal which has a quadrature phase to that of the internal local signal.

10. A transceiver according to claim 9, wherein a band-pass filter for limiting frequency band of the reception baseband signal is connected to the output of said quadrature demodulator.

11. A transceiver according to claim 6, wherein the transmission baseband signal has a peak value of a component which has a phase same as that of the third  
5 local signal and a peak value of another component which has a quadrature phase to that of the third local signal.

12. A transceiver according to claim 11, further  
comprising a band-pass filter for limiting frequency band  
of the transmission baseband signal and supplying the  
band-limited transmission baseband signal to said  
5 quadrature modulator.

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